



Use of Native Urchins as a Restoration Tool for Coral Reefs

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Introduction to the Enemy

- Main species of concern:
 - *Kappaphycus* spp. →
 - *Eucheuma* spp. ↓
 - Smothering Seaweed



Introduction to the Enemy

- Main species of concern:
 - *Gracilaria salicornia*
 - Gorilla seaweed (ogo)
 - *Acanthophora spicifera*
 - Spiny or Prickly seaweed



Acanthophora spicifera

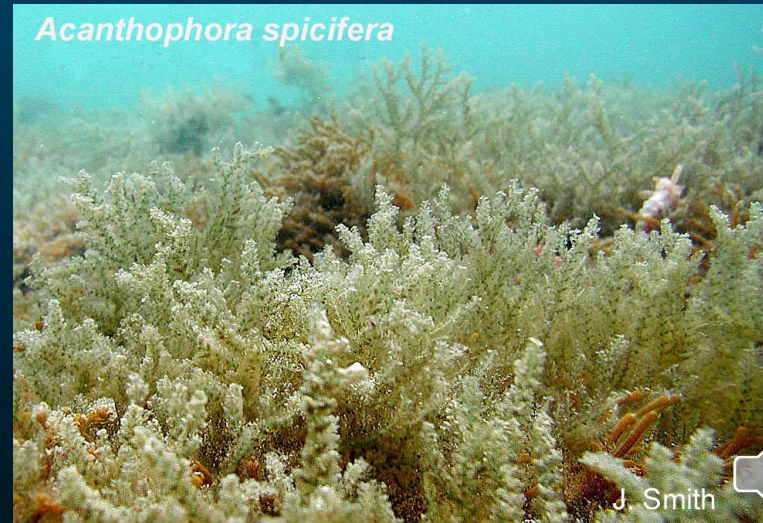
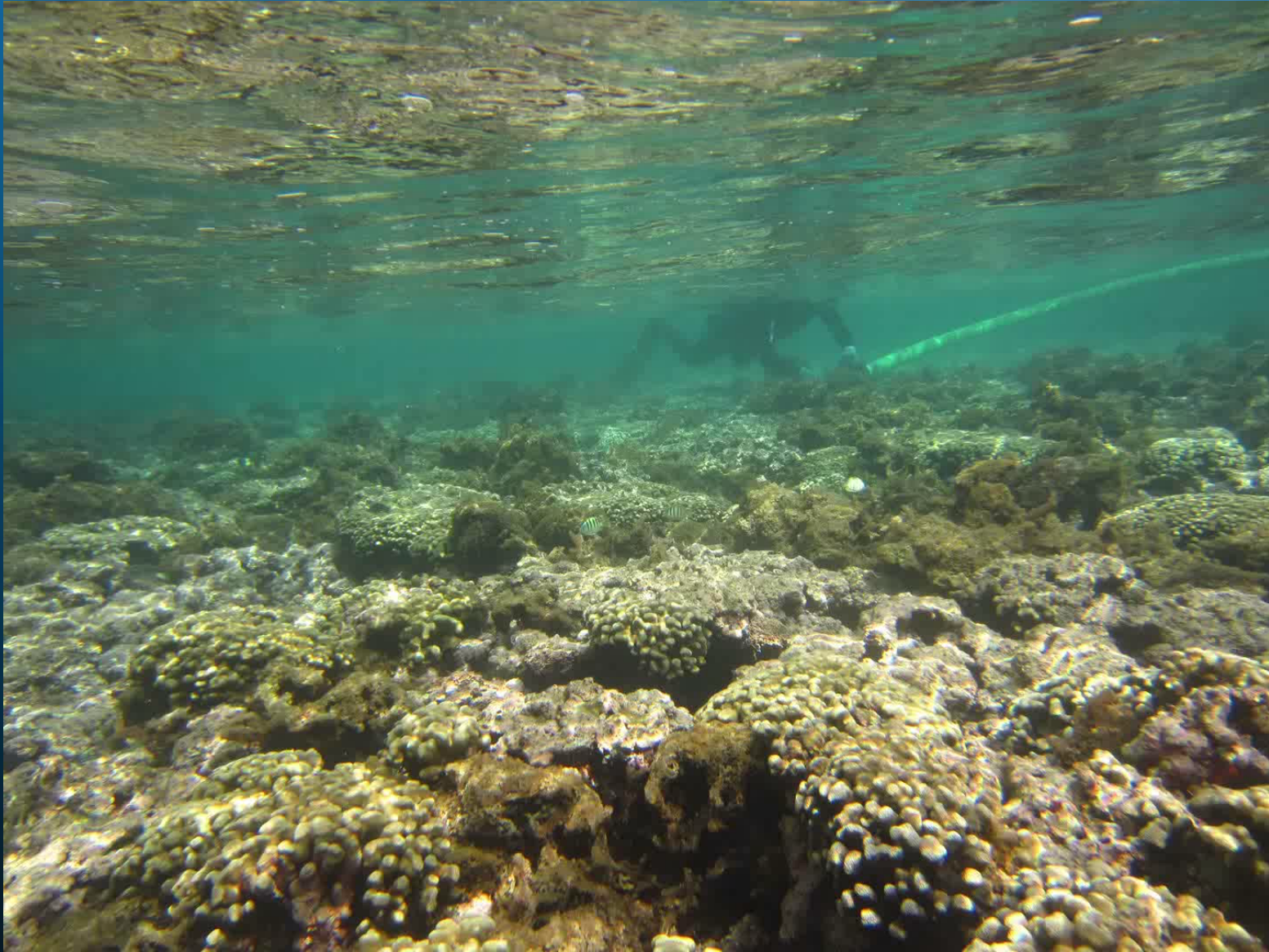




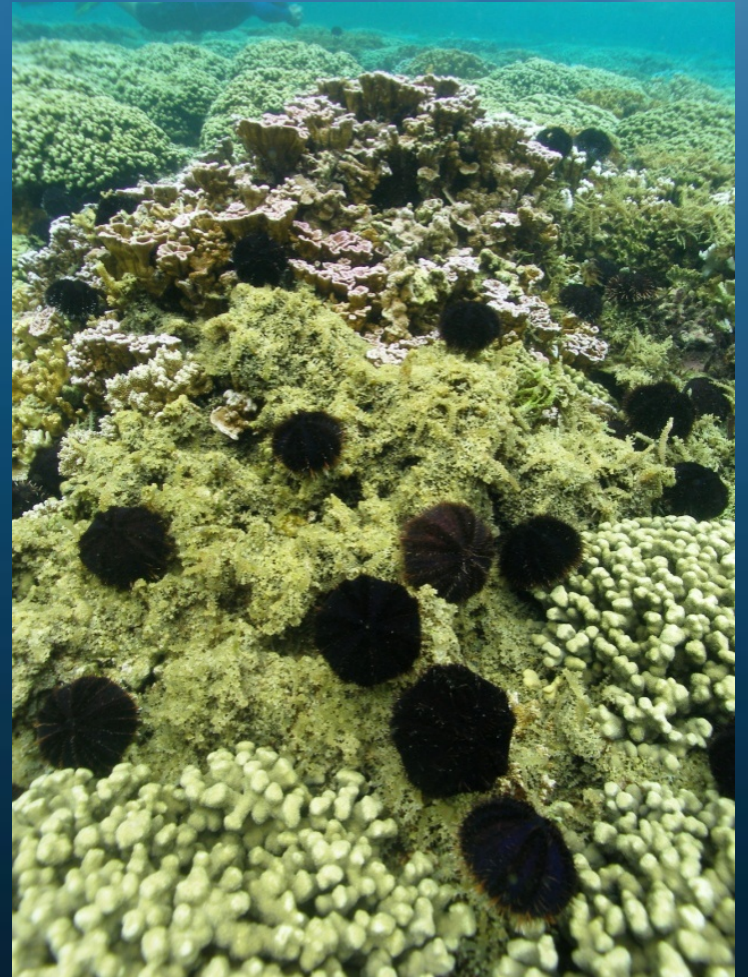
Photo: Sterling Kaya



Algae Removal



Juvenile Urchin Outplanting

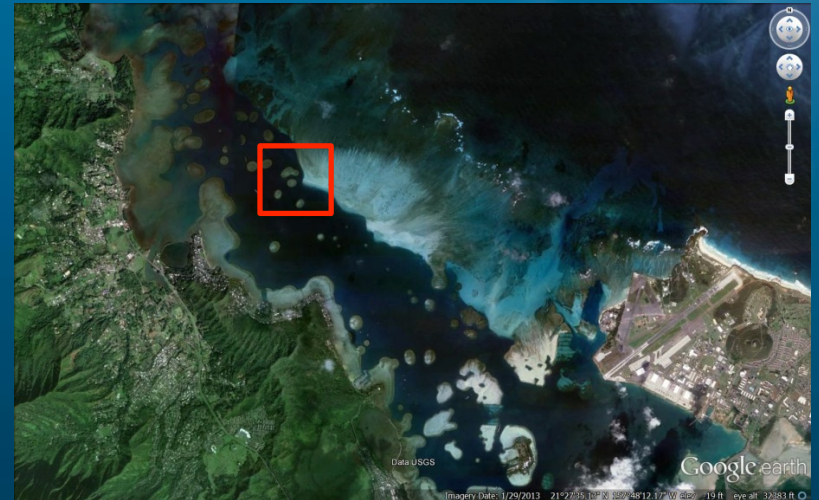


Collector Urchin, “hawae,” *Tripneustes gratilla*

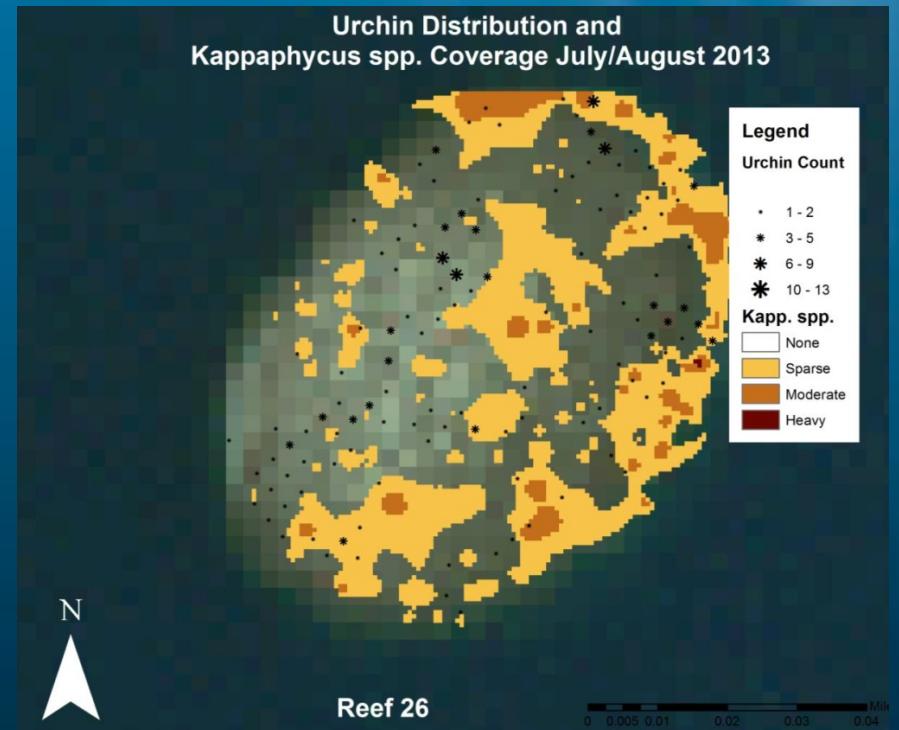
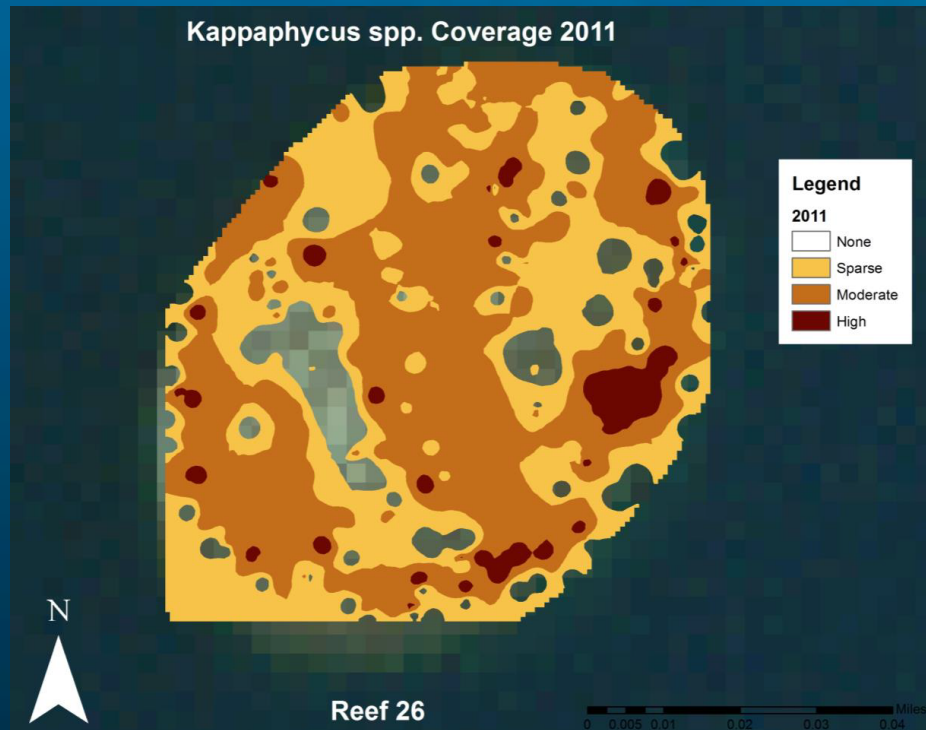


Current Project

- Treatment = Removal & Biocontrol
- 4 Patch Reefs in Central KBay
 - ~64,200 m² (15.9 acres)
 - 3 managed (51,000 m²)
 - 1 control
- Hatchery Raised Urchins
 - Juveniles outplanted at ~15-20mm diameter
 - Target density ~2 urchins/m²
 - No “herding”



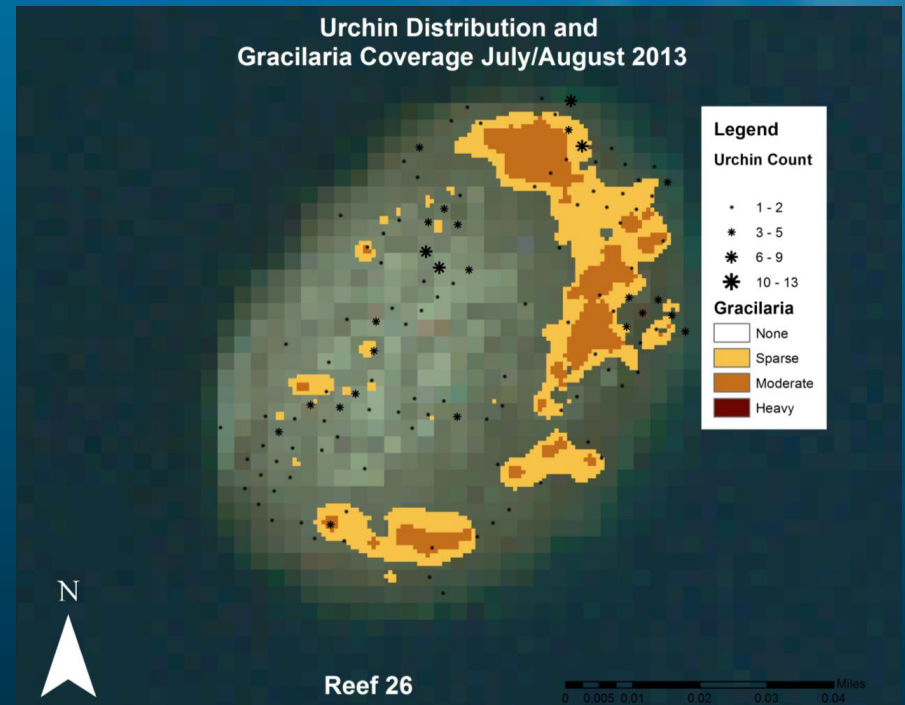
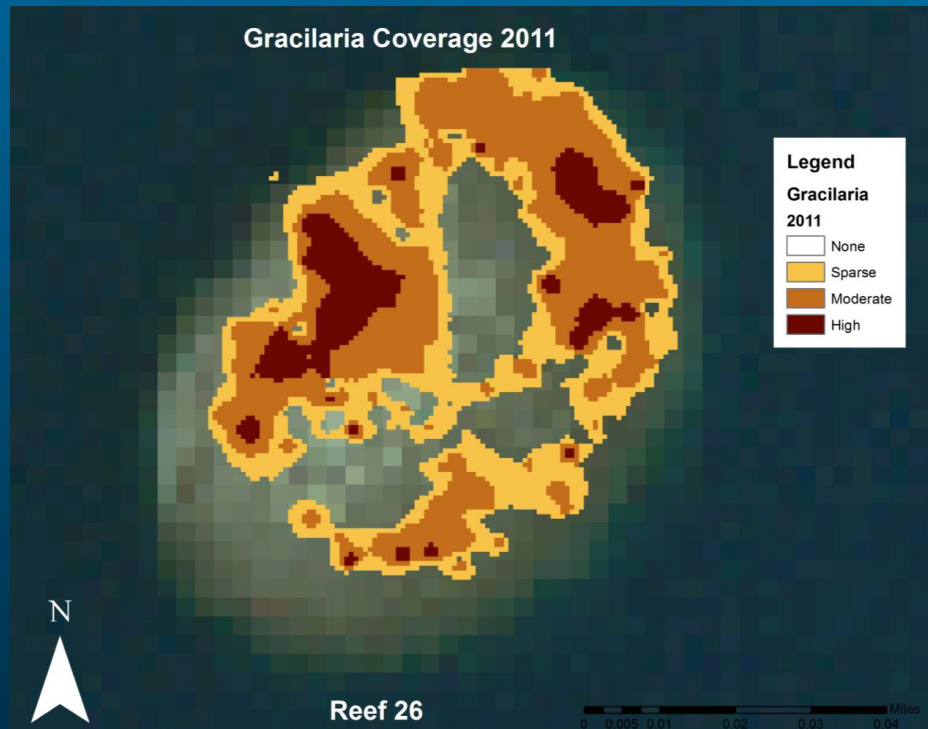
Preliminary Results



- Reef 26: *Kappaphycus/Eucheuma spp*
 - ~12,000 m² (~3 acres)
 - 11,053 lbs (5,014 kg) of K/E removed
 - ~42,000 hatchery raised juvenile urchins outplanted



Preliminary Results



- Reef 26: *Gracilaria salicornia*
 - ~12,000 m² (~3 acres)
 - Only small amounts mechanically removed
 - ~42,000 hatchery raised juvenile urchins outplanted



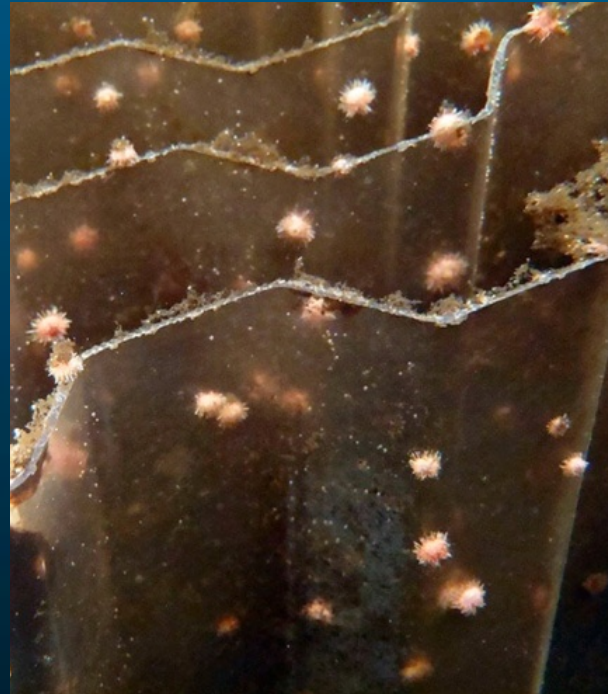






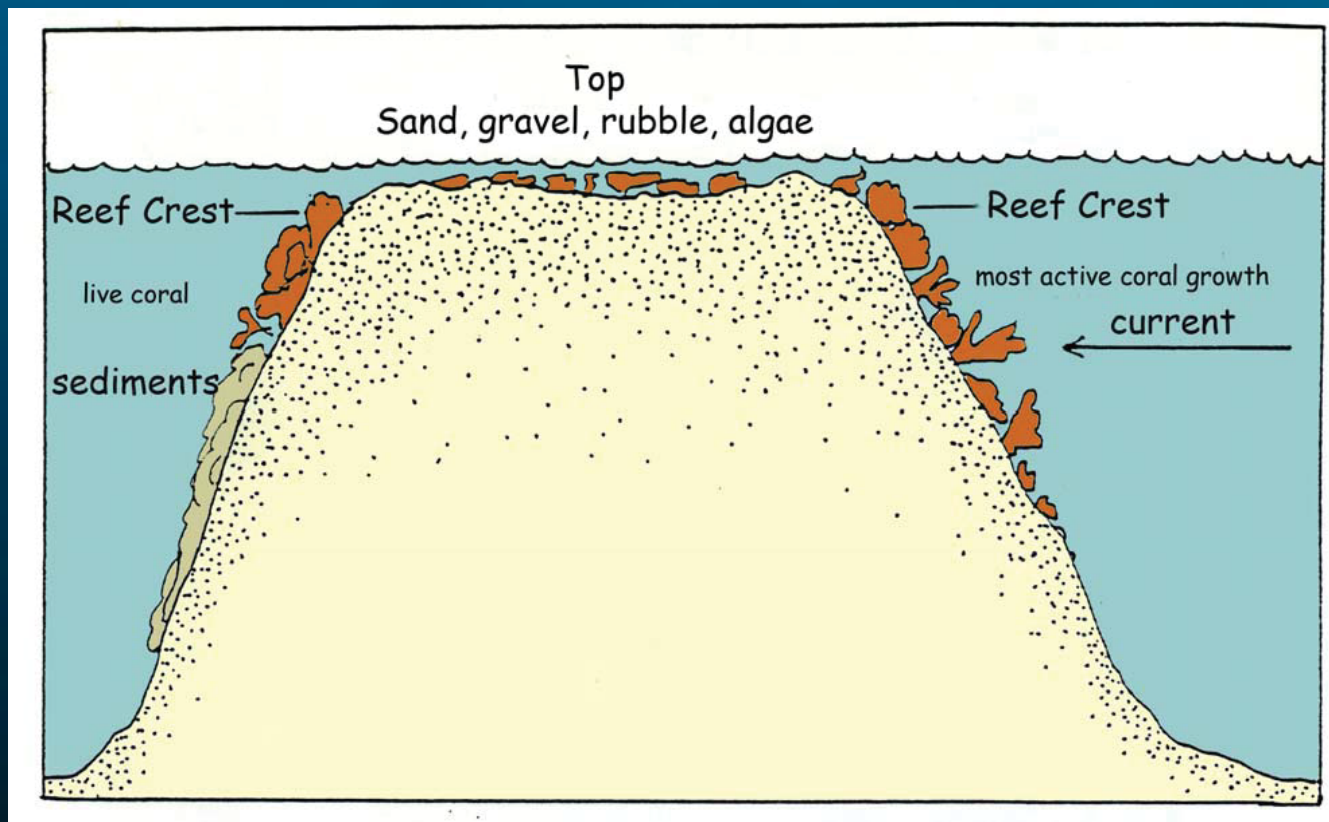
Hatchery Production

- 2012: 60,000 urchins released
- 2013 Jan – June: 27,670 (~70,000 expected for 2013)
- Completed renovations doubling algae production



Future Work

- Refine management tools
 - Targeted strategies for habitat and species



From Jokiell's Illustrated Scientific Guide to Kaneohe Bay. Typescript. 65 pp.



Future Work

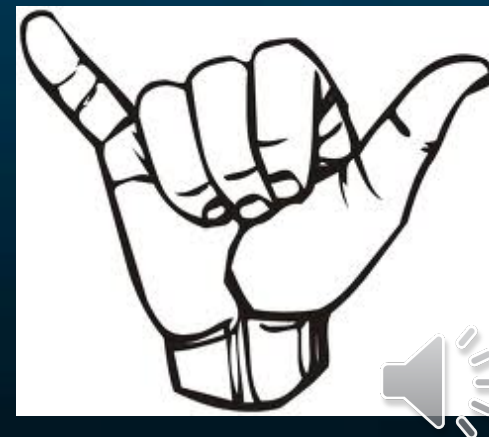
- Refine management tools
 - Determine optimal urchin density, outplant size
 - Determine if “maintenance density” is effective





Mahalos!

- AIS Monitoring, Super Sucker and Urchin Hatchery Crews
- Work funded in part by:
 - NOAA Coral Reef Conservation Agreement
 - USFW Sport Fish Restoration Program
 - NOAA Estuary Restoration Act
 - Hawaii Invasive Species Council



Questions?

Check us out on Facebook: www.facebook.com/noalienseaweed
www.facebook.com/sea.hatchery

